WHAT IS CLAIMED IS:

1. A device for measuring a frequency of a measured signal, said device comprising:

counting means including a plurality of n-nary counters; and

gate means for supplying the measured signal to an input of said respective n-nary counters in order at given time intervals;

wherein a frequency measurement result of the measured signal is supplied from said counting means every given time interval.

2. A method for measuring the frequency of a measured signal, said method comprising the steps of:

providing counting means including a plurality of n-nary counters; and

supplying the measured signal to an input of said respective n-nary counters in order at given time intervals;

wherein a frequency measurement result of the measured signal is supplied from said counting means every given time interval.

3. A device for measuring the frequency of a measured signal, comprising:

a counting section including a number i (i   2) of n-nary counters;

a time reference circuit that outputs a time reference signal, a duration of which is t, every time interval p; and

a number i of gate circuits respective outputs of which are connected to the inputs of said i n-nary counters, each of said i gate circuits having a first input that receives the measured signal, and a second input that receives the time reference signal at the time interval p;

wherein the frequency measurement result of the measured signal is supplied from said counting sections every time interval p.

4. A device as claimed in claim 3, wherein $t = i \cdot p$.

5. A polishing apparatus comprising:

a turn table having a polishing surface;

a top ring for holding an object to be polished;

and an end point detecting mechanism for informing an end point of polishing,

said end point detecting mechanism comprising:

counting means including a plurality of n-nary counters; and

gate means for supplying the measured signal to an input of said respective n-nary counters in order at given time intervals;

and a frequency measuring device for supplying a frequency measurement result of the measured signal from said counting means every given time interval.

6. A polishing method for informing an end point of polishing of an object to be polished by a turn table having a polishing surface, said method comprising:

providing counting means including a plurality of n-nary counters; and

supplying the measured signal to an input of said respective n-nary counters in order at given time intervals;

wherein a frequency measurement result of the measured signal is supplied from said counting means every given time interval.

7. An eddy current sensor for detecting the thickness of an electrically conductive film from a change in an eddy current loss generated in said conductive film, said sensor comprising:

a sensor coil for generating an eddy current in said conductive film; and

an active element unit for oscillating a variable frequency corresponding to said eddy current loss;

wherein said sensor coil and said active element unit are formed integrally.

8. An eddy current sensor according to claim 7, wherein said oscillating frequency generated by said active element unit is in a VHF band.

9. An eddy current sensor according to claim 7, wherein

said sensor detects a change in said eddy current loss as a change in the oscillating frequency.

10. A polishing apparatus having a holder for holding a substrate and a polishing surface for polishing a surface on which semiconductor device are formed by said polishing surface, said polishing apparatus comprising:

an eddy current sensor disposed below or above said substrate for measuring the thickness of a conductive film formed on said substrate,

said eddy current sensor comprising a sensor coil for generating an eddy current in said conductive film and an oscillator circuit connected to and formed integrally with said sensor coil for oscillating a variable frequency corresponding to said eddy current loss.

11. A polishing apparatus according to claim 10, wherein a plurality of said eddy current sensors are disposed below said polished surface.

12. An eddy current sensor for detecting the thickness of a conductive film from a change in an eddy current loss generated in said conductive film, said sensor comprising:

a sensor coil for generating an eddy current in said conductive film;

wherein a change in the thickness of said conductive film is detected from a change in a resistance component in an impedance formed by said sensor coil and said conductive film.

13. An eddy current sensor according to claim 6, capable of outputting a change in a reactance component, a change in phase, and a change in amplitude, in addition to the resistance component.

14. An eddy current sensor comprising:

a sensor coil disposed near a conductive film;

a signal source for supplying said sensor coil with an AC signal; and

a synchronous detector for separating a sin component and a cos component of a signal generated extracted from a terminal of said sensor coil.

15. An eddy current sensor according to claim 14, wherein

said synchronous detector extracts a resistance component from said cos component in an impedance viewed from the terminal of said sensor coil.

16. A method of detecting the thickness of a polished conductive film, comprising:

placing a sensor coil near a conductive film to be polished;

supplying said sensor coil with an AC current of a constant frequency;

measuring an impedance viewed from both terminals of said sensor coil, said impedance including an impedance generated by said conductive film; and

detecting the thickness of said conductive film based on a change in a resistive component in said impedance.

17. A method according to claim 16, wherein said step of detecting the thickness of said conductive film includes detecting the thickness of a barrier layer deposited on a semiconductor substrate.

18. A polishing apparatus having a holder for holding a substrate and a polishing surface, said substrate being polished by said polishing surface, said polishing apparatus comprising:

an eddy current sensor disposed below or above said substrate for measuring the thickness of a conductive film formed on said substrate, said sensor coil being configured to detect a change in the thickness of said conductive film based on a change in a resistance component in an impedance formed by said sensor coil and said conductive film.